



U.S. Army Developmental Test Command



Examining the Business Case for M&S

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Background

OPINION

BUILDING A BUSINESS CASE FOR MODELING AND SIMULATION

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Modeling and simulation technology is the use of models to develop data as a basis for making managerial or technical decisions. It can be a valuable tool for program managers—but it is one that is vastly under-used. This article provides a business-case framework (a methodology to evaluate investment opportunities) for program managers within the Department of Defense to use when determining how to apply modeling and simulation in project management.

The use of modeling and simulation (M&S) is widely misunderstood within the Department of Defense (DoD). M&S is the use of models, either statically or over time, to develop data as a basis for making managerial or technical decisions (DoD, 1997). Models are physical, mathematical, or logical representations of a system, entity, phenomenon, or process. Simulations are methods for implementing models over time. Normally, we associate simulations with a software program that implements models over time, within the context of a given scenario (Defense Modeling and Simulation Office, 1996). Simulations permit the user to assess variables and the predictability of a single or series of outcomes.

Nowhere is the misunderstanding more painfully obvious than within the program management offices of the DoD. Some program managers believe M&S is paramount to effective project development and place the requisite investment in it (and this article highlights examples of some such programs). But many program managers remain both skeptical and suspicious. Recent government direction to use simulation-based acquisition in DoD programs is an example of a policy with good intentions but poorly shaped execution. This edict has been met with, at best, marginal acceptance, and at worst, abject resentment.

Such resentment and apprehension spring from institutionalized biases,

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- Paper prepared for ICAF
- Published in Fall 2000
Acquisition Review Quarterly
- Focus: How Can PMs Justify M&S?
- Answer: Not Easily!



Business Case Framework



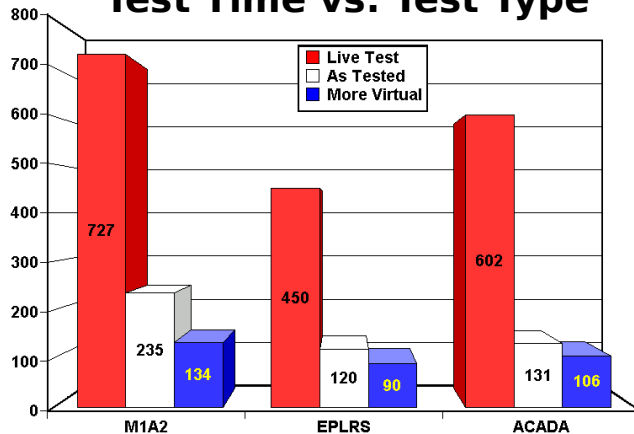
- **Establish a Baseline**
- **Establish a Vision and Direction**
- **Quantify the Costs and Benefits of Alternatives/ Capabilities**
- **Evaluate Alternatives**
- **Conduct Sensitivity Analysis**
- **Develop a Migration Strategy**
- **Monitor the Process and continue to assess results through formalized feedback**



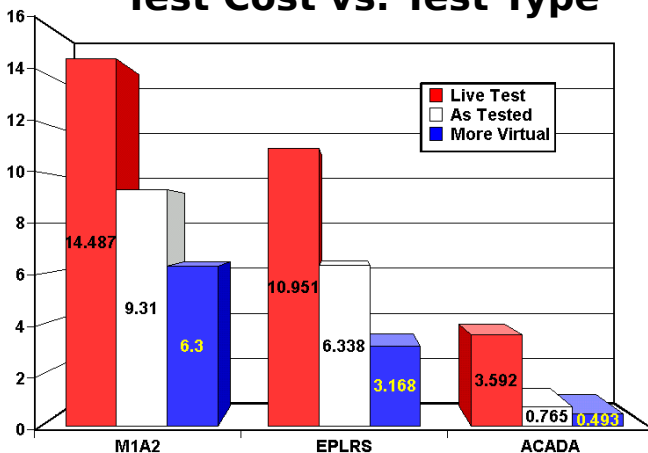
Strategies I've Used



Test Time vs. Test Type



Test Cost vs. Test Type



Goal: Show that using M&S Saved time and money relative to conventional methods.

Method: Track time and cost for M&S-based tests, then estimate backward and forward in time.

Result: Doesn't work. People don't believe estimates.

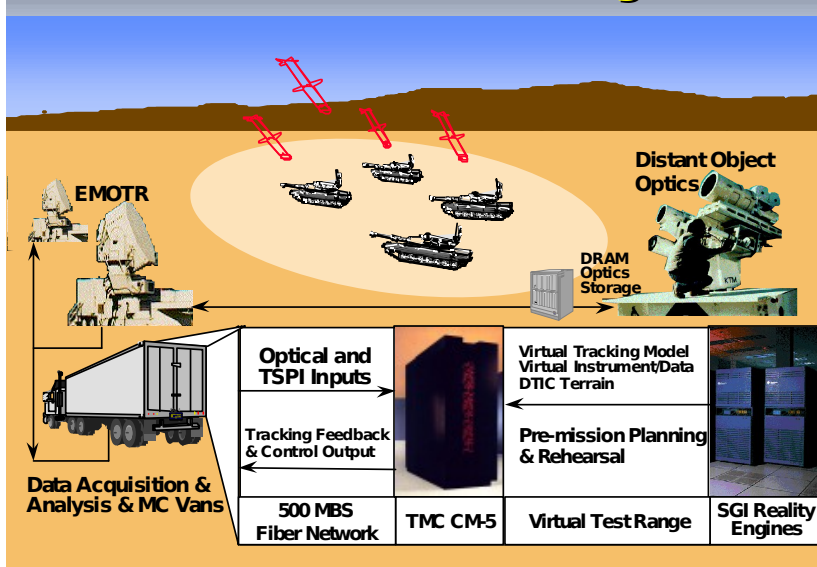


Strategies I've Used

continued



Smart Munitions Testing



Goal: Show that using M&S saved money because you didn't Need as much "live" stuff.

Method: Track the number of simul expendables used during a test, and compute the would-cost if done live

Result: Dangerous! If you saved money, somebody's budget's getting cut!

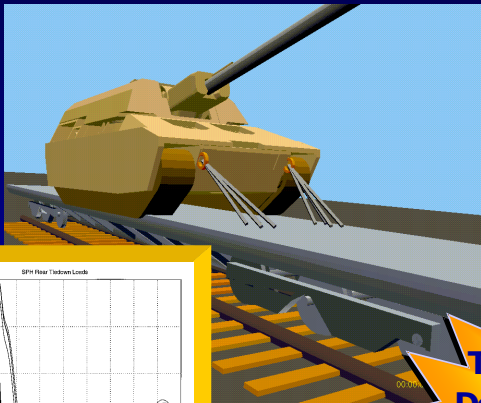


Strategies I've Used

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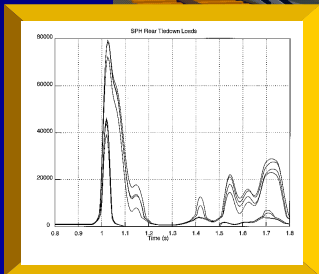


Transportability Testing



- Rail Impact
- Loading & Fit
- Lifting & Tie-down
- Partnership w/ MTMC

Test System
Design Before
Prototyping



Goal: Show that using M&S saved money because you didn't have to do the test.

Method: Use validated and accredited physics-based models.

Result: It works! But, it's rare.



What We Found in ICAF



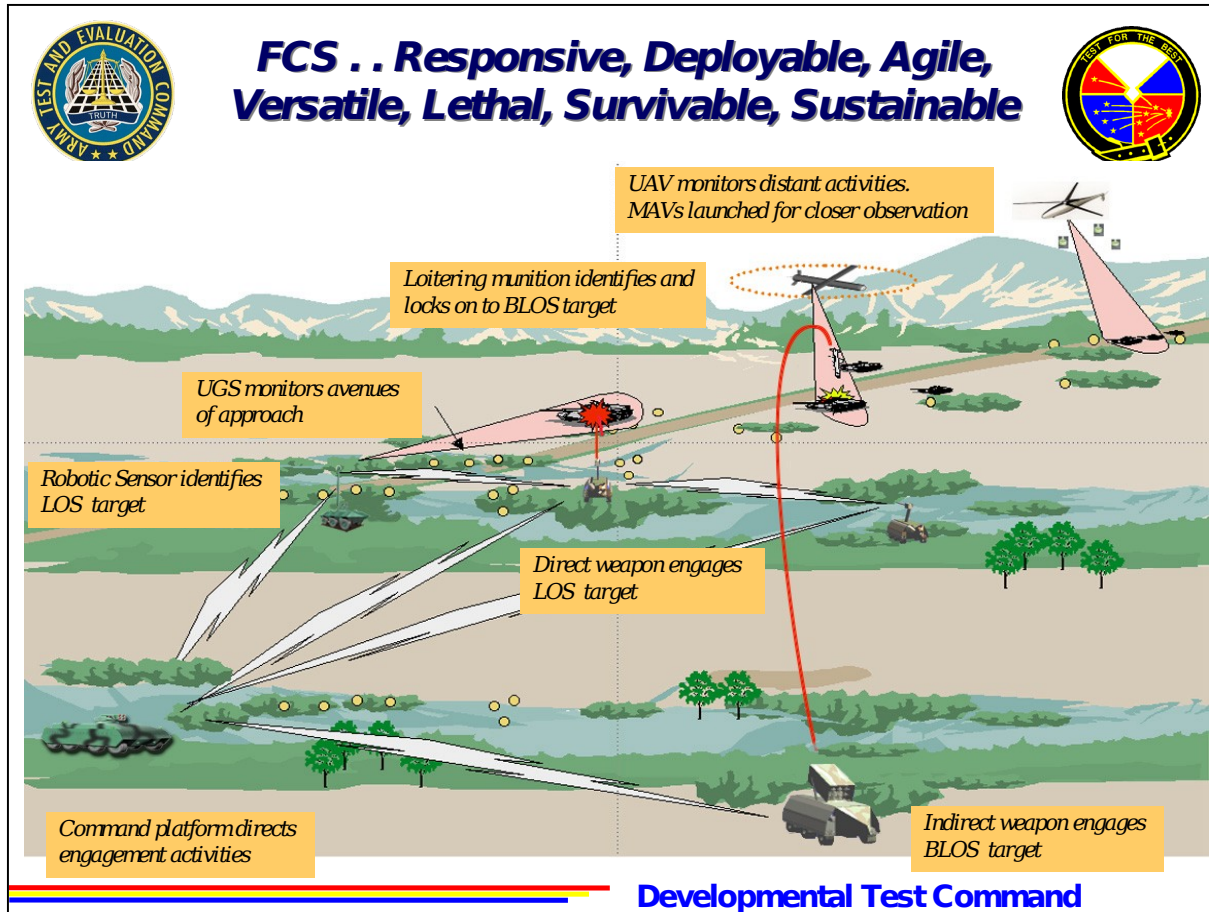
Most program managers justified their M&S investment based on one or more of the following:

- **reducing design cycle time;**
- **augmenting or replacing physical tests;**
- **helping resolve limitations of funds, assets or schedules; or**
- **providing insight into issues that were**

impossible or impracticable to examine



My Current View



- The System-of-Systems of the Future simply can't be tested without M&S
- M&S is best characterized as a structured method for doing your thinking.
- ROI for M&S is not quantifiable because you never really know how much time & effort it saves.
- Action: Prove Me Wrong



Conclusions & Recommendations



- **M&S permits experimentation without risk**
- **M&S is an established business tool**
- **Business case analysis supports justification and brings discipline**
- **Need encouragement to add discipline and structure to the M&S justification process**
- **Requires ready access to policy and guidelines**
- **Managers and staff need adequate training**

Keep Looking for the Quantifiables!